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What's New in the World of Superconductivity (December, 2009)

Akihiko Tsutai, Director
International Affairs Division, ISTEC

Award

Converteam (December 7, 2009)

The Converteam HYDROGENIE project has received the 2009 Innovation Award in the Power and Energy category from the Institution of Engineering and Technology (IET). The HYDROGENIE project involves the application of superconductors to the rotor windings of a superconducting generator for use in a commercially operated hydroelectric power station. A consortium of companies led by Converteam is participating in the project, which has received partial funding from the EU 6th framework program. The project is presently in its final phase of assembly and soon will be installed at a hydroelectric power station in Germany and will begin extensive testing. The IET Innovation Awards span 15 categories and attract approximately 300 entries from around the world, representing a unique opportunity for innovations to be recognized and showcased.

Source:
"Converteam Celebrated Innovation Award"
Converteam press release (December 7, 2009)
http://www.converteam.com/converteam/1/doc/News/PR0912.01_Converteam_Celebrates_Innovation_Awards.pdf

Power

Tres Amigas, LLC (December 9, 2009)

Tres Amigas, LLC, has submitted filings with the U.S. Federal Energy Regulatory Commission (FERC) requesting the approvals needed to proceed with the Tres Amigas SuperStation, the first renewable energy transmission hub to be constructed in North America. The planned SuperStation will be located in New Mexico and will enable the transfer of thousands of megawatts of power among the three existing U.S. power grids (known as "interconnections"). Phil Harris, Chief Executive Officer of LLC, commented, "Since announcing the Tres Amigas SuperStation in early October 2009, interest in and support for the project has been simply overwhelming. The need for new transmission to take America's renewable energy from its point of generation in remote areas to where it is needed most is self-evident. By enabling the exchange of wind, solar and geothermal power between all three grids, the Tres Amigas SuperStation will help break our nation's transmission bottleneck. We believe the merits of this project and the benefits it will provide to the U.S. warrant FERC approval." The project has already received strong endorsements from the state of New Mexico and key industry stakeholders. Upon FERC approval, Tres Amigas will begin negotiations with

several transmission companies regarding connection to the SuperStation. The project is expected to be operational by the end of 2014.
Source:
"TRES AMIGAS FILES WITH FERC FOR AMERICA'S FIRST RENEWABLE ENERGY TRANSMISSION HUB"
Tres Amigas, LLC press release (December 9, 2009)
http://www.tresamigasllc.com/docs/PR-FERC-Filing-12-09.pdf

Brookhaven National Laboratory (December 10, 2009)

Researchers at the Brookhaven National Laboratory have developed a new method for controlling the buildup of hydrogen fluoride gas during crystal growth, a process required for the fabrication of superconductors and other applications. The process has been patented and is expected to lead to improvements in production efficiency and material performance. Fluorine is typically added to crystal precursors to enhance the transfer of crystalline order from the substrate to the growing crystal. However, the buildup of hydrogen fluoride gas is problematic because it slows (and possibly even stops) the reaction that converts the precursor to the desired material. The new method removes hydrogen fluoride based on absorption rather than venting, which can lead to pressure-related problems. A solid material capable of absorbing hydrogen fluoride gas, such as an alkaline earth oxide or a material containing calcium sodium, or activated carbon, is incorporated into the reaction chamber, thereby enhancing the production of high-quality crystalline products. By distributing the material so that it conforms to the shape of the precursor at a uniform distance, hydrogen fluoride gas can be uniformly extracted across large areas, ensuring a homogenous end product. The researchers have demonstrated the effectiveness of their new method by successfully growing YBCO crystals at a faster rate in the presence of a hydrogen fluoride absorber. The method also enabled the uniformity of the crystal growth environment to be preserved, leading to uniform superconducting properties along the length of the film. The new method is available for licensing and commercial development.
Source:
"Absorbing hydrogen fluoride gas to enhance crystal growth"
Brookhaven National Laboratory press release (December 10, 2009)
http://www.bnl.gov/bnlweb/pubaf/pr/PR_display.asp?prID=1041

Magnet

Oxford Instruments (December 1, 2009)

Oxford Instruments, in collaboration with the ISIS Neutron Source (STFC Rutherford Appleton Laboratory, Didcot) and the ILL neutron facility (Institut Laue-Langevin, Grenoble), has delivered the first ever high-field helium-recondensing magnets for neutron scattering applications. Recondensing dewars, which utilize a cryocooler to capture evaporated gas and cool it back to its liquid form, can drastically reduce the helium consumption of high-performance magnets. A 10-T asymmetric split pair coil magnet was delivered to ILL, while two recondensing neutron scattering magnets were delivered to the ISIS Neutron Source. Dr. Eddy Lelièvre-Berna, the Advanced Neutron Environment Team Leader at ILL, commented, "With this new design, the superconducting coils are reliably maintained at low temperature within a liquid helium bath while considerably reducing the boil-off. Compared with dry systems, the absence of

room-temperature bore provides a much larger sample space. It also reduces the amount of material in the beam and avoids unwanted neutron absorption and neutrons scattered to the detectors. Together, we have really made a step forward." Dr. Oleg Kirichek, Sample Environment Group Leader at ISIS, also commented, "Having a recondensing system allows us to considerably reduce our helium cost and health and safety issues. It also provides a homogeneous temperature distribution, which is crucial for optimum magnet performance. With these magnets, we should be able to provide our users with high magnetic field sample environments for neutron scattering experiments in a number of research areas…"
Source:
"Magnet systems for neutron scattering experiments"
Oxford Instruments press release (December 1, 2009)
http://www.oxinst.com/news/Pages/news.aspx

NMR

Bruker BioSpin (December 2, 2009)

Bruker BioSpin has successfully installed the world's first 1000-MHz, ultra-high field NMR AVANCE™ spectrometer at the Centre de Resonance Magnétique Nucléaire à Très Hauts Champs (CRMN) in Lyon, France. The AVANCE 1000 system contains a 23.5-T UltraStabilized™ superconducting magnet, presenting unparalleled research opportunities to the French and European scientists who will have access to this facility. The installation of the device went smoothly, and the magnet has now been ramped up to its operating field, demonstrating excellent homogeneity and drift characteristics. Experiments involving a wide range of scientific topics are now being performed to demonstrate the potential of the new system.
Source:
"World's First 1000 MHz NMR Spectrometer Now Offers New Research Capabilities to European Scientists, Following its Successful Installation at CRMN in Lyon, France"
Bruker BioSpin press release (December 2, 2009)
http://www.bruker-biospin.com/pr091202.html

Bruker Energy & Supercon Technologies, Inc. (December 7, 2009)

Bruker Energy & Supercon Technologies, Inc. (BEST) has completed a 1000-meter unit length of MgB_2 superconducting wire with a strand Je of up to 91 A/mm^2 (4.2 K, 5 T). The MgB_2 wire strand fits into a wire-in-channel superconductor design and is intended for applications like clinical or pre-clinical MRI magnets. The new MgB_2 wire, which has a twist pitch of 75 mm and a Monel sheath, was manufactured within the framework of an R&D collaboration agreement between BEST and IFW Dresden. Next, the MgB_2 strand will be assembled into an insulated wire-in-channel superconductor. Mr. Reinhard Dietrich, Director of Sales and Marketing for superconducting materials at BEST, commented, "In order to reach comparable performance and price levels to today's Nb-Ti wires for MRI systems, further R&D in terms of increased Je performance and manufacturing optimization is necessary. Medium-temperature MgB_2 superconductors could then be the material of choice for future generations of liquid cryogen-free MRI magnets operating at temperatures of 10 – 20 Kelvin without the need for liquid nitrogen or liquid helium cryogens."
Source:

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"MgB2 Medium-Temperature Superconducting Wire Production at Bruker Energy & Supercon Technologies Exceeds 1000 Meter Unit Length"
Bruker Energy and Supercon Technologies, Inc. press release (December 7, 2009)
http://www.bruker-est.com/pr091207.html

Fusion

Bruker Energy & Supercon Technologies, Inc. (December 16, 2009)

Bruker Energy & Supercon Technologies, Inc. (BEST) has announced that its Bruker EAS GmbH subsidiary has been awarded a US $36 million contract to supply 37 metric tons of high-performance niobium-tin superconducting wire for the ITER international fusion energy project. The order was received from Fusion for Energy (F4E), the Barcelona-based agency responsible for providing Europe's contribution to ITER. BEST plans to begin shipping the superconductor strands in the second half of 2010, with subsequent deliveries phased over a 30-month period. The large-scale superconducting magnets made from the niobium-tin strand wire will be used to confine the fusion plasma within the ITER device.
Source:
"Bruker Energy & Supercon Technologies (BEST) Receives $36 Million Contract for High-Performance Superconductors from ITER Fusion Energy Project"
Bruker Energy and Supercon Technologies, Inc. press release (December 16, 2009)
http://www.bruker-est.com/index.php?id=2924

Accelerator

CERN (December 18, 2009)

CERN has reported that the Large Hadron Collider (LHC) has successfully completed its first full period of operation. During this period, collisions at 2.36 TeV were recorded, representing a new world record. Over the last two weeks of the operation period, the six LHC experiments recorded over a million particle collisions; the results of these collisions have now been distributed worldwide for analysis on the LHC computing grid. At present, the LHC has been placed in standby mode and will be restarted in February 2010 after a short technical stop to prepare for even higher energy collisions and the start of the main research program. Director General of CERN, Rolf Heuer, commented, "So far, it is all systems go for the LHC. This first running period has served its purpose fully: testing all the LHC's systems, providing calibration data for the experiments and showing what needs to be done to prepare the machine for a sustained period of running at higher energy. We could not have asked for a better way to bring 2009 to a close."
Source:
"LHC ends 2009 run on a high note"
CERN press release (December 18, 2009)
http://press.web.cern.ch/press/PressReleases/Releases2009/PR20.09E.html

Top of Superconductivity Web21